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SECOND GRADING OF PUBLIC WATER SUPPLIES IN NEW ZEALAND 1965

BOARD OF HEALTH

(UNDER HEALTH ACT 1956)

PUBLISHED DECEMBER 1967

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IN
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F O R E W O R D

In continuation of the Board of Health's policy for the encouragement of improvements in New Zealand's water supplies, the Local Authorities Affairs Committee asked the Department of Health to conduct a Second Grading of public water supplies in 1965.

The following report gives the results of the Second Grading, which was based on a different evaluation technique from the original Provisional Grading of 1961. Consequently, although there is likely to be a discrepancy between these and earlier results, it is considered that the present Grading is more realistic than the original, which was a first attempt to evaluate all New Zealand water supplies on a common basis.

Although there have been improvements in a number of water supplies, the report shows that there is much more to be done to bring public water supplies up to modern standards.

SECOND GRADING OF PUBLIC WATER SUPPLIES IN NEW ZEALAND 1965

A Report Prepared for the Board of Health by the Department of Health

INTRODUCTION

After the adoption of the World Health Organisation's "International Standards for Drinking Water" in 1960 by the Board of Health, it was decided to find out to what extent public water supplies in New Zealand conformed with these Standards.

The Public Health Engineering Section of the Civil Design Office of the Ministry of Works devised a method of evaluation based on the Standards and helped the Department of Health to conduct the survey, the results of which were published by the Board of Health in 1962 as "Provisional Grading of Public Water Supplies in New Zealand", Report Series No.5.

The results may be summarised as follows:-

214 water supplies serving 1,666,000 people were examined and, of these, 122, or 57% of the total, supplying water to 73% of the population who were receiving public water supplies were reasonably satisfactory. The 92 unsatisfactory supplies provided water for 27% of the population on public water supplies and of these supplies 18%, or 38, were found to be highly unsatisfactory. As was expected, it was evident that the smaller supplies were the most unsatisfactory.

Further study of the results of the survey proceeded in order to try to find reasons for the deficiencies in the water supplies and a review of the investigation was published by the Board of Health as "An Evaluation of the Administration and Servicing of New Zealand Water-Supply Undertakings", Report Series No.10 in October 1964.

This Report not only referred to the likely defects in the administration of public water supplies in New Zealand, but also recommended the forming of a permanent statutory body to advise Government on all matters relating to public water supplies.

The Board of Health, when initiating the survey for the Provisional Grading, had decided that, if possible, surveys should be repeated every five years.

The survey and Second Grading which are the subject of this report were conducted in 1965 to comply with this decision. Assistance was given to the Public Health Division of the Department of Health by the Public Health Engineering Section of the Civil Design Office, Ministry of Works, in the development of the Grading System.

METHOD OF CONDUCTING SECOND GRADING 1965

When the results of the Provisional Grading were studied it was found that anomalies in the gradings had developed, apparently because too much reliance had been placed on chemical and bacteriological testing which, in many cases, was so infrequent as to be useless. Sanitary surveys of the catchments supplying the water and examination of the water treatment processes in some cases indicated a much greater danger to health than was evident from the grading.

When preparing to carry out the Second Grading a different evaluation technique was used in order to give due emphasis to all the factors involved in the assessment of the dangers to health in all parts of the water supply. In addition to an assessment of the raw water quality and its treatment, attention was also directed towards methods of determining the possible deterioration of the quality of the water circulating in the distribution system. This not only required evaluation of the more obvious risks of contamination associated with ball hydrants and uncovered service reservoirs, but also of the standard of supervision by the authority responsible for the management of the water supplies which, in most cases, is a local authority.

It was expected to be difficult to produce an evaluation system which would apply equally to all water supplies, but it was found that the system finally adopted produced a reasonably accurate assessment of the health risks of water supplies.

Before the survey was conducted throughout the country, a grading was completed in one representative Health District and the results were studied critically. After further amendments were made to the scheme it was decided to proceed forthwith with the Second Grading of all water supplies.

The text of a Circular Memorandum issued to all Medical Officers of Health on 22 September 1965 which instructed them to conduct the Second Grading of public water supplies is reproduced in Appendix 'A'. The Grading Analysis Form and Explanatory Notes are also given in Appendix 'A'.

A second Circular was issued on 25 November 1965, advising Medical Officers of Health of amendments to the Grading Analysis forms. The text is given in Appendix 'B'.

In each District, results were summarised on the forms shown in Appendix 'C'. This not only gave each District a comprehensive picture of the public water supplies in its district but enabled Head Office to collate the information.

RESULTS OF THE GRADING

The Grading was in two parts: the first was an evaluation of the health risks associated with the raw water quality at the source and the degree to which these risks were reduced by water treatment processes and other relevant factors.

Marks were divided into categories of acceptability of health risk as follows:-

Marks	Supply (Source) Grading
Less than 3	A (completely satisfactory);
3 to 6	B (fair);
7 to 10	C (not generally acceptable but may have to be accepted in some small communities);
11 to 15	D (high degree of risk - not acceptable);
16 to 20	E (extremely high degree of risk).

In the second part demerit marks were given for a number of factors in management and distribution of the water supply which affect the quality of the water in the distribution system and consequently endanger health. The marks were categorised as

above and the degree of risk in the distribution system identified by the letters "a" to "e" in lower case type. Thus a complete grading for a water supply can be shown as B/b or B/a, according to the result.

382 water supplies were graded and the results grouped into four general categories for a national analysis:-

		Column Heading
1.	Least danger to health from water source and distribution system hazards. (Gradings: Aa, Ab, Ba, Bb);	Satisfactory
2.	Least danger to health from water source but some distribution system hazards. (Gradings: Ac, Ad, Ae, Bc, Bd, Be);	Satisfactory source, Unsatisfactory distribution
3.	Considerable danger to health from water source but satisfactory distribution system. Gradings: Ca, Cb, Da, Db, Ea, Eb);	Unsatisfactory source, Satisfactory distribution.
4.	Considerable danger to health from water source and distribution system. (Gradings: Cc, Cd, Ce, Dc, Dd, De, etc).	Unsatisfactory

Table I is an analysis of the Second Grading showing the supplies in each of the four categories above, the population supplied by them, and the type of water supply authority.

TABLE I.

SECOND GRADING OF PUBLIC WATER SUPPLIES
ANALYSIS BY TYPES OF WATER SUPPLY AUTHORITY

TYPE OF WATER SUPPLY AUTHORITY	Satisfactory		Satisfactory Source Unsatisfactory Distribution		Unsatisfactory Source Satisfactory Distribution		Unsatisfactory		Totals	
	No.	Population	No.	Population	No.	Population	No.	Population	No.	Population
Cities (above 20,000 pop.)	11	641,760	4	220,200	3	110,650	3	78,800	21	1,051,410
Boroughs	16	109,084	34	265,600	7	41,550	59	210,182	116	626,406
County Towns and Villages	27	39,880	23	130,661	14	15,727	64	35,715	128	221,983
Independent Town Districts	-	-	3	2,580	1	840	4	3,480	8	6,900
Government	19	11,246	30	10,045	12	8,290	48	11,855	109	41,436
Totals:	73	801,970	94	629,086	37	177,047	178	340,032	382	1,948,135
Percentage of Supplies in each Category	19		25		10		46		100	
Percentage of Population on Public Water Supplies in each Category		41		32		9		18	100 = 75% of total population of New Zealand (2.6m)	

Number of Supplies Satisfactory	167 (44%)	Supplies with Satisfactory Distribution	110 (29%)
Population on Public Water Supplies with Satisfactory Sources	1,431,056 (73%)	Population on Public Water Supplies with Satisfactory Distribution	979,017 (50%)
Unsatisfactory Sources	215 (56%)	Supplies with Unsatisfactory Distribution	272 (71%)
Population on Public Water Supplies With Unsatisfactory Sources	517,369 (27%)	Population on Public Water Supplies with Unsatisfactory Distribution	969,118 (50%)

The analysis shows that 73 water supplies providing water for 801,970 people or 41% of the population on public water supplies were satisfactory and that the dangers to health in distribution systems were also at a satisfactorily low level.

178 water supplies providing water to 340,032 people or 18% of the population on public water supplies were unsatisfactory in both source and distribution.

There were 94 supplies, providing water to 629,086 people or 32% of the population on public water supplies, which, while having a satisfactory supply, had unacceptably high health risks in the distribution system. The remaining 37 supplies had an unsatisfactory source with a satisfactorily low level of health risk in the distribution system.

Thus there is need for improvement in 309 (81%) of the country's water supplies.

GRADINGS OF INDIVIDUAL SUPPLIES

Local Authorities' officers concerned have been informed of the grading of their water supplies through Medical Officers of Health and the implications of the results have been discussed.

Table II gives the grading of Local Authority and Government water supplies.

COMMENTS

As mentioned in the Explanatory Notes attached in Appendix 'A' discrepancies between the Second Grading and the Provisional Grading may be explained either because the basis of evaluation has been changed or because there has been a change in the supply or its treatment. The greater emphasis on the sanitary survey of the water supply, instead of on the evidence given by insufficiently frequent bacteriological testing, will also have had an effect on the grading.

Although most operations in public water supply are in some way associated with protection or promotion of the public health, the Grading was not designed to take every aspect of water supplies and their management into account. The local authority's responsibility for supplying pure water is derived from the provisions of the Municipal Corporations' and the Counties Acts and it is further emphasised in the Health Act. The management of public water supplies is regarded as a primary public health duty of local authorities. From the results of the Second Grading contained in this report, it may be inferred that in many instances there are deficiencies in the management and operation of water supplies by local authorities which should be rectified without further delay. Much of this evidence arose from the Provisional Grading and was used as the basis for the Board's "Evaluation of the Administration and Servicing of New Zealand Water-Supply Undertakings", Report Series No.10, published in 1964. Local authorities having difficulty in financing improvements in water quality and distribution should consider using the provisions of Section 143 of the Municipal Corporations Act, or Section 165 of the Counties Act, to establish funds for the repair, renewal and improvement of their systems. Serious consideration should also be given to the regrouping of smaller water supplies under a single water supply authority for management purposes. In this respect the Report is significant in showing that 52% of the water supplies providing water for 642,000 people and which are administered by city councils are satisfactory, while 50.4% of supplies in smaller towns providing water for 249,377 people are wholly unsatisfactory. In the first

case the population supplied by each undertaking averages 58,500 and in the second only 1,970.

The high standard of living which is general in New Zealand is not reflected in the results of this assessment of the public health aspects of public water supplies. The Board of Health considers that consumers of water from public supplies should be able to expect drinking water of a satisfactory quality anywhere in the country. It wishes that local authorities should review the deficiencies in their water supplies which are indicated by the Second Grading and recommends that the initiation of corrective measures should be given the highest priority.

APPENDIX 'A'

DEPARTMENT OF HEALTH

WELLINGTON

22 September 1965

CIRCULAR MEMORANDUM

Medical Officers of Health.

PUBLIC WATER SUPPLIES
Second Grading, 1965

The Local Authority Affairs Committee of the Board of Health has asked the Department to conduct a second grading of public water supplies in New Zealand.

The results of the first Provisional Grading were published in the Board of Health Report Series No.5 in 1962.

The evaluation now to be undertaken is to include all water supplies previously graded, new supplies, and others which were left out previously.

The grading scheme to be used is based on similar principles to those adopted for the Provisional Grading in 1962, supplemented by the views expressed in Report Series No.10., "An Evaluation of the Administration and Servicing of New Zealand Water-Supply Undertakings".

The Second Grading Scheme is in two parts, the first being a measure of the quality of the water delivered to the distribution system, and the second an estimation of the degree of risk of loss of the quality of the water delivered to the consumer.

The basis of the evaluation is a system of marking in which demerits are awarded for factors affecting adversely the quality of the water supply, and merit marks are awarded for factors in favour of maintaining or restoring the water quality.

The first part of the evaluation commences with an estimation of a demerit mark for the sanitary survey of the catchment. To this is added a mark based on the degree of compliance with the physical and chemical standards of the World Health Organisation's International Standards for Drinking Water, giving a total of demerit marks. Then merit marks are awarded for various types and stages of water treatment, and are deducted from the demerit marks. By reference to a table it is possible to obtain a grading, ranging between "A" and "E".

In the second part of the evaluation, demerit marks are awarded for a number of factors in management and distribution of the water supply which affect the quality of the water in the reticulation system. Reference to a table enables a grading for management and distribution to be given.

The two gradings may then be written in a combined form, e.g. "Ab" or "Ca", the first letter being related to the quality of water in the supply, and being comparable with the results of the Provisional Grading 1962; and the second letter, in lower case, being a first assessment of the quality of management and supervision of the supply as a whole.

There is expected to be a discrepancy in the new gradings between the larger and smaller towns, especially in the second part of the grading which should reflect the difference in the

degree of management and supervision exercised by the smaller authorities.

There may also be apparent discrepancies between the current results and those obtained in the previous Provisional Grading. It is likely that there will be a similar relativity between the grading of water supplies, if there has been no improvement since the last evaluation. Some differences may be explained, because unchlorinated supplies with satisfactory bacteriological tests will have been adversely marked. This is because of the emphasis on the greater degree of risk associated with such supplies.

It may be found that the grading system does not appear to produce a just assessment of all types of water supply. If so, it may be either that the grading scheme is not applicable to the particular type of supply, or that the grading system gives a truer assessment of the condition of the supply than was previously available. If the former, it may be necessary, by reference to Head Office, to obtain a modified form to use for the type of supply.

The grading scheme is intended to cover the public health aspects of the water supplies only, and the award of an "A/a" grading will not necessarily indicate that a water supply is wholly satisfactory. There are other matters not included which may seriously affect the consumer's judgment of a supply, e.g. iron-staining of washing and hosing restrictions. Therefore, when discussing results with local authorities and the public, there should be no suggestion that the Department is attempting to judge water supplies in all their aspects.

The Second Grading of public water supplies is as "sanitary work" as mentioned in Section 25 of the Health Act, and "waterworks for the supply of pure water", as mentioned in Section 240 of the Municipal Corporations Act and Section 267 of the Counties Act.

The attached Explanatory Notes give detailed instructions for completion of the forms. Three copies of the Grading forms and two copies of the summary are to be sent to Head Office by 30 November 1965.

Division of Public Health

APPENDIX 'A'

Department of Health,
Head Office,
P.O. Box 5013,
WELLINGTON.

PUBLIC WATER SUPPLIES
SECOND GRADING 1965

EXPLANATORY NOTES ACCOMPANYING CIRCULAR MEMORANDUM OF 22.9.65

1. Three copies of the Grading Analysis and two copies of the Summary are to be returned to Head Office.

2. Item (1). Insert name by which water supply is commonly known.

3. Item (2). Insert location and brief description. Where there are several different intakes on one supply or different sources, evaluate each one separately, complete a separate Part I, and obtain a grading for each source. If the supply is normally derived from a river catchment but may be replaced for a period of not less than three days by water from some other satisfactory source, such as wells, complete one form only, making the appropriate allowance in Section B of Part I.

4. Item (3). The figure required is that of the actual population supplied from the reticulation. It may be more or less than the figure normally quoted as the population of the appropriate local authority.

The peak figure is expected to be a fair estimate based on information obtainable from local authorities of numbers of visitors and campers resident during the peak holiday period.

5. Item (4). Insert the name of the department responsible for the government establishment.

6. Item (5). Insert date of completion of form.

7. Items (13) and (18). Complete both Sections A1 and A2 and insert the greater figure in Item (23). Marking in Section A is to be based on the results of a sanitary survey.

The coliform limit given in Item (6) is that set as the limit for "Class B" water in the Waters Pollution Regulations 1963.

A "deep well" is defined as a well of any depth, provided there there is a satisfactory impervious layer between the aquifer it is tapping and ground water strata above it. "Protected" means that the well is to be lined through shallower aquifers and that there is not likely to be leakage along the outside of the well casing.

"Infiltration gallery" is defined as a porous horizontal pipe or gallery laid in or close to a river bed and adequately covered by layers of sand and gravel from which water is drawn. It is to be understood that the gravel or sand filter shall be of sufficient thickness to produce water of low turbidity at all times. If it has been necessary to adopt expedients in order to maintain the yield of the gallery at the cost of increased turbidity, the intake is to be assessed under one of the items for an open intake.

8. In Section A3 discount the frequency of sampling and testing required in the W.H.O. International Standards.

9. In Section B.1 "auto residual control chlorination" is defined as a system of chlorination, the dosage rate of which is controlled automatically by a device which is continuously sampling and testing the chlorine residual in the disinfected water, and is capable of a range of dosage sufficient to meet the chlorine demand of the water at all times.

10. Section B.2 is included to make an allowance for the treatability of the raw water. Additional demerit marks are awarded appropriately.

Item 36 for which minus four marks are awarded, is a device to allow for reduction in the degree of risk associated with having sufficient storage or a suitable alternative source to allow the normal intake to be shut off when the raw water quality is too bad for the treatment plant to be able to produce water of a satisfactory quality.

By following the rule for subtraction of a minus quantity in algebra of changing the sign and adding the mark of minus four awarded in Section B.2 becomes, in effect, an extra merit mark in Section B.1.

11. In Item (40) of Part II, "professional staff" refers to the employment of professional engineering staff by a local authority. Ministry of Works' Engineers can be assumed to be supervising Government water supplies.

12. Item (41) refers to operation by the local authority's or Ministry of Works' staff.

13. Item (42). Local authorities are to be given the benefit of the doubt and only if there is <u>no enforcement at all</u> of the Water Supply Protection Regulations, is a demerit mark to be given.

14. In Item (47) if there is no chlorination of the supply, mark as subsection (d) "Usually no residual".

15. In marking Item (48), ignore whether frequency and number of samples complies with W.H.O. International Standards.

Division of Public Health,
WELLINGTON.

September, 1965

APPENDIX 'B'

DEPARTMENT OF HEALTH
WELLINGTON.

25 November 1965

CIRCULAR MEMORANDUM

Medical Officers of Health.

PUBLIC WATER SUPPLIES : SECOND GRADING 1965
AMENDMENTS 2 AND 3

1. Further to Circular Memoranda of 22 September 1965 and of 19 October 1965, experience of the Grading scheme has shown that further amendments are required.

2. On the first page of the Grading Analysis, in order to assess correctly a spring which is fenced and in a remote location but not covered, an extra item is to be added to A. Please insert Item "11(a) Protected Spring - 4 marks", where appropriate.

This marking is to apply to any spring which is protected but not covered.

A covered spring, in a remote location, where there is no possibility of contamination with faecal matter or effluent should be marked as Item 12.

3. On page 2 of the Grading Analysis please change the demerit mark awarded in Item 33 to 2. The existing demerit mark has resulted in unduly low gradings of water supplies.

4. In cases where the grading of the supply appears to be low in comparison with the Provisional Grading it is useful to assess desirable additional water treatment stages and to deduct the appropriate marks from the Supply Grading. If the result is an "A" Grading, your original assessment was reasonable.

If unrealistically high Gradings are awarded, it may be difficult subsequently to persuade local authorities of the need for further water treatment.

In appropriate cases it would be helpful when discussing the water supply grading with a local authority to give credit to keen staff whose efforts are a major factor in the production of satisfactory water from a poor treatment plant.

Division of Public Health

TABLE II — SECOND GRADING OF PUBLIC WATER SUPPLIES 1965 — SHEET 1

A. SUPPLIES CONTROLLED BY LOCAL AUTHORITIES

Supply for	Controlling Authority	Health District	Grading	Remarks
Akaroa	Akaroa County Council	Christchurch	Dd	
Akitio Beach	Akitio County Council	Palmerston North	Cc	
Alexandra	Alexandra Borough Council	Dunedin	Dd	
Allandale	MacKenzie County Council	Timaru	Ed	Rural Scheme
Amberley	Kowai County Council	Christchurch	Cc	
Arrowtown	Arrowtown Borough Council	Invercargill	Dc	
Ashburton	Ashburton Borough Council	Timaru	Dc	
Auckland	Auckland City Council	Auckland	Ab	Auckland Regional Authority Bulk Supply
Auckland Regional Bulk Supply	Auckland Regional Authority	Auckland	Ab	Waitakere and Hunua Catchments
		Takapuna	Ab	Waitakere Catchment
		South Auckland	Aa	Hunua and Mangatawhiri Catchments
Balclutha	Balclutha Borough Council	Dunedin	Ab	
Bay View	Hawkes Bay County Council	Napier	Cb	
Belmont	Hutt County Council	Lower Hutt	Ab	
Benhar	Bruce County Council	Dunedin	Ab	
Benneydale	Waitomo County Council	Hamilton	Ed	
Birkenhead	Birkenhead Borough Council	Takapuna	Ad	Auckland Regional Authority Bulk Supply
Blackball	Grey County Council	Nelson	Cd	
Blenheim	Blenheim Borough Council	Nelson	Ab	
Bluff	Bluff Borough Council	Invercargill	Cc	
Brixton	Taranaki County Council	New Plymouth	Ed	
Brunner	Brunner Borough Council	Nelson	Cb	
Bulls	Bulls Town Board	Wanganui	Aa	
Burke's Pass	MacKenzie County Council	Timaru	Ed	
Cambridge	Cambridge Borough Council	Hamilton	Bd	Springs
			Ac	Lake Karapiro
Carterton	Carterton Borough Council	Lower Hutt	Ac	
Cashmere	Heathcote County Council	Christchurch	Ac	
Christchurch	Christchurch City Council	Christchurch	Ac	
Christchurch International Airport	Airport Authority	Christchurch	Cb	
Clyde	Vincent County Council	Dunedin	Ce	

Supply for	Controlling Authority	Health District	Grading	Remarks
Coromandel	Coromandel County Council	Hamilton	Ed	Cadman and Petute Streams
			Ed	Karaka Stream
Cromwell	Cromwell Borough Council	Dunedin	Dd	Pisa Range Creek
			Dd	Firewood Creek
Calverden	Amuri County Council	Christchurch	Cd	
Dannevirke	Dannevirke Borough Council	Palmerston North	Ed	
Dargaville	Dargaville Borough Council	Whangarei	Ed	
Devonport	Devonport Borough Council	Takapuna	Ac	Auckland Regional Authority Bulk Supply
Downlands	Downlands Water Supply Committee	Timaru	Ed	Rural Scheme
Dunedin	Dunedin City Council	Dunedin	Ab	Sullivans Dam
			Ab	Ross Creek
			Aa	Southern Reservoir
Dunrobin	Mackenzie County Council	Timaru	Ec	Rural Scheme
Duntroon	Waitaki County Council	Timaru	Db	
Eastbourne	Eastbourne Borough Council	Lower Hutt	Ac	Lower Hutt Bulk Supply
East Coast Bays	East Coast Bays Borough Council	Takapuna	Ac	Auckland Regional Authority Bulk Supply
Edgecumbe	Whakatane County Council	Rotorua	Ab	
Eketahuna	Eketahuna Borough Council	Palmerston North	Ed	
Ellerslie	Ellerslie Borough Council	Auckland	Ad	Auckland Regional Authority Bulk Supply
Eltham	Eltham Borough Council	New Plymouth	Ed	
Enfield	Waitaki County Council	Timaru	Db	
Fairlie	Mackenzie County Council	Timaru	De	
Featherston	Featherston Borough Council	Lower Hutt	Ee	Abbott's Creek
			Ed	Boar Bush Stream
Feilding	Feilding Borough Council	Palmerston North	Ed	
Foxton	Foxton Borough Council	Palmerston North	Cd	
Geraldine	Geraldine Borough Council	Timaru	Ed	
Geraldine Downs	Geraldine County Council	Timaru	Ed	
Gisborne	Gisborne City Council	Gisborne	Bb	Te Arai River
			Bb	Mangapoike Dam
Glen Avon - Bell Block	Taranaki County Council	New Plymouth	Da	
Glen Eden	Glen Eden Borough Council	Takapuna	Ad	Auckland Regional Authority Bulk Supply

TABLE II: SECOND GRADING OF PUBLIC WATER SUPPLIES : 1965 SHEET 3

Supply for	Controlling Authority	Health District	Grading	Remarks
Glenside	Hutt County Council	Lower Hutt	Ed	
Goodwood	Waihemo County Council	Dunedin	Bb	
Gore	Gore Borough Council	Invercargill	Dc	Oldham St Bores
			Ac	Jacobstown Bores
Greymouth & Korokoro	Greymouth Borough Council	Nelson	Cc	
Greytown	Greytown Borough Council	Lower Hutt	Ed	
Halswell	Halswell County Council	Christchurch	Ac	
Hamilton	Hamilton City Council	Hamilton	Ba	
Hampden	Hampden Borough Council	Timaru	Ec	
Hanmer	Amuri County Council	Christchurch	Dd	
Hastings	Hastings City Council	Napier	Ab	
Hauraki Plains West (Ngatea)	Hauraki Plains County Council	Hamilton	Dd	
Hauraki Plains East (Turua)	Hauraki Plains County Council		Cc	Waihou River
" " "			Ed	Apakura Stream
Havelock North	Havelock North Borough Council	Napier	Ac	
Havelock	Marlborough County Council	Nelson	Ed	
Hawera	Hawera Borough Council	New Plymouth	Ab	
Heathcote	Heathcote County Council	Christchurch	Ac	Avoca Valley Area
Heathcote Valley	Heathcote County Council	Christchurch	Ad	Lyttelton Borough Supply
Helensville	Helensville Borough Council	Takapuna	Bd	
Henderson	Henderson Borough Council	Takapuna	Ad	Auckland Regional Authority Bulk Supply
Herbert	Waitaki County Council	Timaru	Eb	
Heretaunga	Hutt County Council	Lower Hutt	Ac	
Hikurangi	Hikurangi Town Council	Whangarei	Ed	
Hokitika	Hokitika Borough Council	Nelson	Cc	
Hornby - Sockburn	Paparua County Council	Christchurch	Ac	
Howick	Howick Borough Council	South Auckland	Ac	
Hunterville	Hunterville Town Board	Wanganui	Ed	Glenmorven Reservoir
			Ed	Rangitira Reservoir
Huntly	Huntly Borough Council	Hamilton	Bc	
Inglewood	Inglewood Borough Council	New Plymouth	Cc	
Invercargill	Invercargill City Council	Invercargill	Cb	

Supply for	Controlling Authority	Health District	Grading	Remarks
Kaiapoi	Kaiapoi Borough Council	Christchurch	Ac	Artesian Well; North Road
			Ac	" " Dale Street
			Ac	" " Hilton Street
			Ae	" " Sewell Street
			Ae	" " Davie Street
Kaikohe	Kaikohe Borough Council	Whangarei	Ac	Bores
			Ec	Upland Surface Catchment
Kaikoura	Kaikoura County Council	Christchurch	Dd	
Kaitaia	Kaitaia Borough Council	Whangarei	Ec	
Kaitangata	Kaitangata Borough Council	Dunedin	Ab	
Kaiwhaiki Pa	Wanganui County Council	Wanganui	Bc	
Kamo	Whangarei City Council	Whangarei	Bc	
Kaponga	Kaponga Dependent Town Board (Eltham County Council)	New Plymouth	Ee	
Karangahake	Ohinemuri County Council	Hamilton	Cc	
Katikati	Tauranga County Council	Rotorua	Cd	
Kauru Hill	Waitaki County Council	Timaru	Ec	Rural Scheme
Kawakawa	Kawakawa Town Council	Whangarei	Ed	
Kawerau	Kawerau Borough Council	Rotorua	Bb	
Kawhia	Otorohanga County Council	Hamilton	Bc	Bore,
			Ed	Seymours Supply (Springs)
Kelson	Hutt County Council	Lower Hutt	Ab	
Kihikihi	Kihikihi Town Board	Hamilton	Ac	
Kopu	Thames County Council	Hamilton	Dd	
Kumara	Kumara Borough Council	Nelson	Dd	
Kurow	Waitaki County Council	Timaru	Ed	
Lawrence	Lawrence Borough Council	Dunedin	Dd	
Lepperton	Taranaki County Council	New Plymouth	Cb	
Levin	Levin Borough Council	Palmerston North	Ab	
Little River	Wairewa County Council	Christchurch	Ed	Upland Surface Catchment
			Ed	Western Valley Stream
Lower Hutt	Lower Hutt City Council	Lower Hutt	Ab	
Lyttelton	Lyttelton Borough Council	Christchurch	Ad	
Maheno	Waitaki County Council	Timaru	Dd	
Maketu	Tauranga County Council	Rotorua	Ab	
Manaia	Manaia Town Board	New Plymouth	Ee	

TABLE II: SECOND GRADING OF PUBLIC WATER SUPPLIES : 1965 SHEET 5

Supply for	Controlling Authority	Health District	Grading	Remarks
Mangaweka	Rangatikei County Council	Wanganui	Ec	
Manukau Harbour	Auckland Habour Board	Auckland	Cd	Supplied by Onehunga Borough Council
Manunui	Manunui Town Council	Wanganui	A	Proposed Supply
Maoribank and Birchville	Hutt County Council	Lower Hutt	Ab	
Martinborough	Martinborough Borough Council	Lower Hutt	Cd	
Marton	Marton Borough Council	Wanganui	Bc	
Matakana	Rodney County Council	Takapuna	Ec	
Matamata	Matamata Borough Council	Hamilton	De	
Matata	Whakatane County Council	Rotorua	Dc	
Matatoki	Thames County Council	Hamilton	Ed	
Mataura	Mataura Borough Council	Invercargill	Ab	
Masterton	Masterton Borough Council	Lower Hutt	Dd	
Maungatoroto	Otamatea County Council	Whangarei	Ed	
Methven	Ashburton County Council	Timaru	Ee	
Milton	Milton Borough Council	Dunedin	Ab	
Moerewa	Bay of Islands County Council	Whangarei	Bc	
Momona Airport	Dunedin City Council	Dunedin	Aa	
Morrinsville	Morrinsville Borough Council	Morrinsville	Ac	
Mosgiel	Mosgiel Borough Council	Dunedin	Dc	
Mount Albert	Mount Albert Borough Council	Auckland	Ad	Auckland Regional Authority Bulk Supply
Mount Eden	Mount Eden Borough Council	Auckland	Ad	Auckland Regional Authority Bulk Supply
Mount Maunganui	Mount Maunganui Borough Council	Rotorua	Ec	
Mount Roskill	Mount Roskill Borough Council	Auckland	Ac	Auckland Regional Authority Bulk Supply
Mount Wellington	Mount Wellington Borough Council	Auckland	Ad	Auckland Regional Authority Bulk Supply
Mowhanau	Waitotara County Council	Wanganui	A	Proposed supply
Murupara	Murupara Borough Council	Rotorua	Ab	
Napier	Napier City Council	Napier	Ab	
Naseby	Naseby Borough Council	Dunedin	Dd	
Nelson	Nelson City Council	Nelson	Ed	Brook Catchment
			Cc	Maitai Catchment
			Ed	Roding Catchment
New Lynn	New Lynn Borough Council	Takapuna	Ad	Auckland Regional Authority Bulk Supply
Newmarket	Newmarket Borough Council	Auckland	Ad	Auckland Regional Authority Bulk Supply
New Plymouth	New Plymouth City Council	New Plymouth	Da	
Ngakawau and Hector	Buller County Council	Nelson	Ed	

Supply for	Controlling Authority	Health District	Grading	Remarks
Ngaruawahia	Ngaruawahia Borough Council	Hamilton	Ab	Bores
			Cb	Upland Bush Catchment
Ngongotaha	Rotorua County Council	Rotorua	Cb	
Normanby	Hawera County Council	New Plymouth	Bd	
Norsewood	Dannevirke County Council	Palmerston North	Ab	
Northcote	Northcote Borough Council	Takapuna	Ad	
No.2 Road (Rural)	Tauranga County Council	Rotorua	Dd	
Oakura	Taranaki County Council	New Plymouth	Cc	
Oamaru	Oamaru Borough Council	Timaru	Ec	
Ohai	Wallace County Council	Invercargill	Ee	
Okakune	Ohakune Borough Council	Wanganui	Cd	
Ohura	Ohura Town Council	Wanganui	Bb	
Omahu	Hawkes Bay County Council	Napier	Ab	
Omahu	Thames County Council	Hamilton	Ed	Omahu Stream
			Ed	Apakura Stream
Onehunga	Onehunga Borough Council	Auckland	Ca	
One Tree Hill	One Tree Hill Borough Council	Auckland	Ac	Auckland Regional Authority Bulk Supply
Ophir	Vincent County Council	Dunedin	Dd	
Opotiki	Opotiki Borough Council	Gisborne	Dd	
Opunake	Egmont County Council	New Plymouth	Bb	
Otaki	Otaki Borough Council	Palmerston North	Ab	
Otane	Patangata County Council	Napier	Cc	
Otautau	Otautau Town Board	Invercargill	Db	
Otorohanga	Otorohanga Borough Council	Hamilton	Cb	
Outram	Taieri County Council	Dunedin	Ed	
Owhata	Rotorua County Council	Rotorua	Cb	
Paekakariki	Hutt County Council	Lower Hutt	Dc	
Paeroa	Paeroa Borough Council	Hamilton	Dd	Waitawheta Stream
			Dd	Tarariki Stream
Pahiatua	Pahiatua Borough Council	Palmerston North	Bc	
Palmerston	Palmerston Borough Council	Dunedin	Cd	Spring in Horse Range
			Dd	Well by Shag River
Palmerston North	Palmerston North City Council	Palmerston North	Ab	
Papakura	Papakura Borough Council	South Auckland	Ab	
Papatoetoe	Papatoetoe Borough Council	South Auckland	Ac	

TABLE II: SECOND GRADING OF PUBLIC WATER SUPPLIES : 1965 SHEET 7

Supply for	Controlling Authority	Health District	Grading	Remarks
Paraparaumu	Hutt County Council	Lower Hutt	Bc	
Paremata and Plimmerton	Hutt County Council	Lower Hutt	Ab	Wellington Metropolitan Bulk Supply
Patangata County Depot (Waipukurau)	Patangata County Council	Napier	Cb	
Patea	Patea Borough Council	New Plymouth	Ad	
Peel Forest	Geraldine County Council	Timaru	Ed	
Petone	Petone Borough Council	Lower Hutt	Ac	Wells in Buick Street
			Dc	Wells in Tennyson Street
Picton	Picton Borough Council	Nelson	Ee	
Pinehaven	Hutt County Council	Lower Hutt	Ab	Wellington Metropolitan Bulk Supply
Porangahau	Patangata County Council	Napier	Ed	
Porirua	Porirua City Council	Lower Hutt	Ac	Wellington Metropolitan Bulk Supply
Port Chalmers	Port Chalmers Borough Council	Dunedin	Bd	
Pukekohe	Pukekohe Borough Council	South Auckland	Ac	
Pukeuri Village	Waitaki County Council	Timaru	Ee	
Putaruru	Putaruru Borough Council	Hamilton	Ab	
Putiki	Wanganui County Council	Wanganui	Ad	Proposed Supply
Queenstown	Queenstown Borough Council	Invercargill	Dd	
Raetihi	Raetihi Borough Council	Wanganui	Dc	
Raglan	Raglan County Council	Hamilton	Ab	
Ranfurly	Maniototo County Council	Dunedin	Dd	
Rangiora	Rangiora Borough Council	Christchurch	Cd	
Ratana Pa	Rangitikei County Council	Wanganui	Ac	
Reefton	Inangahua County Council	Nelson	Dd	
Reidston	Waitaki County Council	Timaru	Ed	Rural Scheme
Richmond	Richmond Borough Council	Nelson	Ac	Appleby Well
			De	Richmond Reservoir
Riccarton	Riccarton Borough Council	Christchurch	Ae	
Ross	Ross Borough Council	Nelson	Ee	
Roxburgh	Roxburgh Borough Council	Dunedin	Ed	
Rotorua	Rotorua City Council	Rotorua	Cc	Waipa Forest Springs
			Cc	Utahina Springs
Rotowaro	Raglan County Council	Hamilton	Ab	

Supply for	Controlling Authority	Health District	Grading	Remarks
Runanga & Rapahoe	Runanga Borough Council	Nelson	Cb	
Seddon	Awatere County Council	Nelson	Db	
Shannon	Shannon Borough Council	Palmerston North	Bd	
Stokes Valley	Lower Hutt City Council	Lower Hutt	Aa	Wellington Metropolitan Bulk Supply
Stratford	Stratford Borough Council	New Plymouth	Dd	
Taihape	Taihape Borough Council	Wanganui	Cc	
Takapuna	Takapuna City Council	Takapuna	Ad	Auckland Regional Authority Bulk Supply
Taneatua	Whakatane County Council	Rotorua	Bb	
Tapanui	Tapanui Borough Council	Dunedin	Ed	
Tarakohe Cement Works, housing & School	Golden Bay Cement Company	Nelson	Ab	
Tasman Village	Tasman Pulp and Paper Company	Rotorua	Aa	
Taumarunui	Taumarunui Borough Council	Wanganui	Aa	
Taumutu	Ellesmere County Council	Christchurch	Bd	
Taupo	Taupo Borough Council	Rotorua	Db	
Tauranga	Tauranga City Council	Rotorua	Ab	
Tawa	Tawa Borough Council	Wellington	Ab	Wellington Metropolitan Bulk Supply
Te Aroha	Te Aroha Borough Council	Hamilton	Cd	
Te Awamutu	Te Awamutu Borough Council	Hamilton	Ed	
Te Awanga	Hawkes Bay County Council	Napier	Ab	
Te Mania	Tauranga County Council	Rotorua	Dd	
Te Hara	Albertland Dairy Company	Takapuna	Ac	
Te Kaha	Opotiki County Council	Gisborne	Dc	Taraketiki Creek
			Cc	Upland Catchment
Te Kuiti	Te Kuiti Borough Council	Hamilton	Dd	
Temuka	Temuka Borough Council	Timaru	Dd	
Te Puke	Te Puke Borough Council	Rotorua	Cc	
Te Teko	Whakatane County Council	Rotorua	Ab	
Timaru	Timaru City Council	Timaru	Cc	
Thames	Thames Borough Council	Hamilton	Ee	
Thorntons Bay	Thames County Council	Hamilton	Ed	
Tinui	Masterton County Council	Lower Hutt	Ad	
Tirau	Matamata County Council	Hamilton	Aa	

TABLE II: SECOND GRADING OR PUBLIC WATER SUPPLIES : 1965 SHEET 9

Supply for	Controlling Authority	Health District	Grading	Remarks
Tokarahi	Waitaki County Council	Timaru	Ed	
Tokoroa	Matamata County Council	Hamilton	Ab	Springs and bore
Tuakau	Tuakau Borough Council	South Auckland	Cd	
Upper Hutt	Upper Hutt Borough Council	Lower Hutt	Ab	Wellington Metropolitan Bulk Supply
Urenui Domain	Clifton County Council	New Plymouth	Cb	
Waharoa	Matamata County Council	Hamilton	Ab	
Waianakarua	Waitaki County Council	Timaru	Ec	
Waiau	Amuri County Council	Christchurch	Cc	
Waihi Beach	Ohinemuri County Council	Hamilton	Ab	
Waikari/Hawarden	Waipara County Council	Christchurch	Cc	
Waikawa Bay	Marlborough County Council	Nelson	Ed	
Waikino	Ohinemuri County Council	Hamilton	Ed	
Waikouaiti	Waikouaiti Borough Council	Christchurch	Dc	
Waimangaroa	Buller County Council	Nelson	Dd	
Waimairi	Waimairi County Council	Christchurch	Ac	
			Ac	Burwood area
Waihi	Waihi Borough Council	Hamilton	Bd	
Waimarie	Buller County Council	Nelson	Ec	
Waimate	Waimate Borough Council	Timaru	Ed	Hayes Creek
			Dd	Waimate Stream
Wainuiomata	Hutt County Council	Lower Hutt	Ac	Wellington Metropolitan Bulk Supply
Waiouru	Rangitikei County Council	Wanganui	Ca	
Waipara	Waipara County Council	Christchurch	Ac	
Waipawa	Waipawa Borough Council	Napier	Cc	
Waipori	Dunedin City Council	Dunedin	Cd	
Waipukurau	Waipukurau Borough Council	Napier	Cc	
Wairoa	Wairoa Borough Council	Gisborne	Ab	
Waitara	Waitara Borough Council	New Plymouth	Ee	
Waitemata Harbour	Auckland Harbour Board	Auckland	Ad	Auckland Regional Authority Bulk Supply
Waitemata	Waitemata County Council	Takapuna	Ac	Auckland Regional Authority Bulk Supply
Waiuku	Waiuku Borough Council	South Auckland	Cc	
Wanaka	Lake County Council	Invercargill	Ab	
Wanganui	Wanganui City Council	Wanganui	Ca	Stream
			Aa	Springs

Supply for	Controlling Authority	Health District	Grading	Remarks
Warkworth	Warkworth Town Council	Takapuna	Aa	
Waverley	Waverley Town Board	New Plymouth	Ac	
Wellington	Wellington City Council	Wellington	Aa	Wellington Metropolitan Bulk Supply
Wellsford	Rodney County Council	Takapuna	Ab	
Weston	Waitaki County Council	Timaru	Eb	
Wesport & Carters Beach	Westport Borough Council	Nelson	Dc	
Windsor	Waitaki County Council	Timaru	Eb	Rural Scheme
Winton	Winton Borough Council	Invercargill	Dd	
Whakatane	Whakatane Borough Council	Rotorua	Cb	
Whangarei	Whangarei City Council	Whangarei	Ac	Hatea Stream
			Bc	Springs
			Ac	Waiarohia Stream
Woodville	Woodville Borough Council	Palmerston North	Ed	

TABLE II SECOND GRADING OF PUBLIC WATER SUPPLIES : 1965 SHEET 1

B. Supplies under Control of Departments of Central Government

Supply for	Government Dept.	Grading	Health District	Remarks
Flockhouse Training Farm, Bulls	Agriculture	A/b	Wanganui	
Paraparaumu Airport	Civil Aviation	D/c	Hutt	
Army Dept., Mangaroa	Defence	E/d	Hutt	Casley's Creek
Burnham Military Camp	"	A/d	Christchurch	
Hopu Hopu " "	"	B/b	Hamilton	
Irirangi Naval Station	"	C/b	Wanganui	Hautapu Stream
N.Z. Air Force Stn. Weedons		A/d	Christchurch	
Wigram Air Force Station	"	A/c	Christchurch	
Otakaieke - Campbell Park School	Education	C/c	Timaru	
Ashley	Forestry	A/d	Christchurch	
Balmoral	"	C/c	Christchurch	Main Camp
"	"	A/c	Christchurch	Rail siding
Conical Hills	"	E/c	Dunedin	
Eyrewell	"	A/d	Christchurch	
Hanmer	"	C/d	Christchurch	
Kaingaroa	"	A/b	Rotorua	
Kaipara Flats	"	E/c	Takapuna	
Karioi	""	D/d	Wanganui	
Maramarua	"	E/c	Hamilton	
Ngamu Forest	"	B/c	Hutt	
Pureora	"	E/d	Hamilton	
Rangiora	"	C/d	Christchurch	
Riverhead	"	A/b	Takapuna	
Santoft	"	A/c	Wanganui	
Waipa	"	E/c	Rotorua	
Woodhill	"	E/c	Takapuna	
Cherry Farm	Health	C/c	Dunedin	
Hornby Lodge	"	A/c	Christchurch	
Kingseat	"	A/c	Sth. Auckland	
Lake Alice	"	A/b	Wanganui	
Ngawhatu	"	E/b	Nelson	
Orokonui	"	C/c	Dunedin	
Seacliff	"	C/c	Dunedin	
Sunnyside	"	A/c	Christchurch	
Templeton	"	A/c	Christchurch	
Te Puia	"	A/a	Gisborne	

Supply for	Government Dept.	Grading	Health District	Remarks
Paparua Prison	Justice	A/d	Christchurch	
Rolleston Prison	"	A/d	Christchurch	
Waikeria Prison	"	D/a	Hamilton	
Waikune Prison	"	D/c	Wanganui	
Waipiata Youth Centre	"	D/c	Dunedin	
Queen Elizabeth Park	Lands & Survey	B/c	Hutt	
Arowhenua Pa	Maori Affairs	C/c	Timaru	
Addington	Electricity	A/d	Christchurch	
Arapuni	"	B/c	Hamilton	
Aratiatia	"	C/a	Rotorua	
Atiamuri	"	D/b	Rotorua	
Fordell	"	A/d	Wanganui	
Highbank	"	D/c	Timaru	
Hororata	"	C/c	Christchurch	
Karapiro	"	D/c	Hamilton	
Islington	"	A/c	Christchurch	
Lake Coleridge	"	D/c	Christchurch	
Lake Waitaki	"	D/c	Timaru	
Maraetai	"	D/a	Rotorua	
Matahina	"	A/b	Rotorua	
Meremere	"	B/a	Hamilton	
Ohakuri	"	A/c	Rotorua	
Otematata	"	E/d	Timaru	
Roxburgh	"	C/c	Dunedin	
Southbrook	"	A/c	Christchurch	
Tekapo	"	D/d	Timaru	
Upper Takaka	"	E/d	Nelson	
Waipapa	"	B/b	Rotorua	
Wairakei	"	B/a	Rotorua	
Whakamaru	"	A/b	Rotorua	
Arthur's Pass	Railways	D/d	Christchurch	
Culverden	"	D/d	Christchurch	
Kellyville	"	D/c	Sth. Auckland	
Maymorn	"	C/d	Hutt	
Oaro	"	E/d	Christchurch	
Otira	"	B/b	Nelson	
Seargill	"	C/d	Christchurch	
Springfield	"	A/d	Christchurch	
Waiau	"	D/d	Christchurch	
Waipara	"	C/c	Christchurch	
Lincoln	D.S.I.R.	A/c	Christchurch	Deep well - administration

Supply for	Government Dept.	Grading	Health District	Remarks
Lincoln	D.S.I.R.	A/c	Christchurch	Shallow well
Oxford	S.A.C.	A/c	Christchurch	
Leeston	"	A/d	Christchurch	
Lincoln	"	A/d	Christchurch	
Franz Joseph	Tourist & Publicity	B/b	Nelson	
Pukaki	"	D/d	Nelson	
Tokaanu	"	E/d	Rotorua	
Tongariro National Park - Chateau	"	C/c	Wanganui	
Waitomo Caves	"	E/d	Hamilton	
Aratiatia	M.O.W.	D/b	Rotorua	
Ardmore College	"	A/b	Sth. Auckland	
Aviemore	"	E/d	Timaru	
Fox Glacier	"	E/e	Nelson	
Golden Downs	"	C/b	Nelson	
Haast	"	C/c	Nelson	
Inangahua	"	D/c	Nelson	
Lakes Hill	"	D/c	Wanganui	
Linton	"	A/c	Palmerston Nth.	
Manapouri	"	D/b	Invercargill	
Mangakino	"	D/b	Rotorua	
Mokau	"	D/d	Hamilton	
Ohakea	"	A/b	Palmerston Nth.	
Okaihau	"	B/c	Whangarei	
Papakura	"	A/b	Sth. Auckland	
Ravensthorpe	"	A/b	Sth. Auckland	
Rawene	"	E/c	Whangarei	
Turangi	"	A/a	Rotorua	
Woodbourne	"	A/b	Nelson	
Lincoln College	Canterbury University	A/c	Christchurch	

H. 125/390:

DEPARTMENT OF HEALTH
Head Office,
P.O. Box 5013,
Wellington.

PUBLIC WATER SUPPLIES SECOND GRADING 1965

The Explanatory Notes should be studied before completing this form.

1. Supply for: .....
2. Source: (a) .....
   (b) .....
   (c) .....
3. Population supplied: (a) Permanent: .....
   (b) Holiday peak: .....
4. Local Authority *or* Government Department: .....
5. Date: .....

GRADING ANALYSIS:

PART I - SUPPLY -

A. Source -

		MARKS:
	A.1 Human Pollution (select appropriate marks) -	
6.	Gross sewage contamination (coliforms over 5000 per 100 ml)	23
7.	*or* Known moderate sewage contamination	20
8.	*or* Known slight sewage contamination	16
9.	*or* Likely casual sewage contamination (parks, farms, milling)	14
10.	*or* Possible casual sewage contamination (distant bushed but unprotected catchments or shallow well)	12
11.	*or* No likely human pollution (fenced patrolled catchment or infiltration gallery)	8
12.	*or* No possible human pollution (protected deep well)	0
13.	*Selected A.1 Marks:*	.....
	A.2 Animal Pollution -	
14.	Considerable stock pollution (especially by cattle)	14
15.	*or* Some stock pollution (farmed catchment, no cattle near streams)	12
16.	*or* Slight stock and wild animal pollution (some sheep in catchment or wild animals in bush)	8
17.	No animal pollution (protected well supply)	0
18.	*Selected A.2 Marks:*	.....
	A.3 Chemical and Physical Quality of Water -	
19.	Finished water complying W.H.O. Int. Stds (chemical and physical)	0
20.	*or* Finished water complying W.H.O. Int. Stds (chem. and phys.) except to minor extent in respect of one non-toxic contaminant	1
21	*or* Finished water not complying W.H.O. Int. Stds.	3
22.	*Selected A.3 Marks:*	.....
23.	*A.1 or A.2 marks* whichever is greater:	.....
24.	Total Marks A (*A.1* or *A.2* plus *A.3*)	.....

B. Treatment –

	B.1 Treatment Operations (select marks and add) –	MARKS:	SELECTED MARKS:
25.	Impounding storage (more than 30 days)	3	
26.	Pre-chlorination	3	
27.	Settlement (a) with chem. coagulation	3	
	or (b) without chem. coagulation	2	
	(Note – in this item deduct 1 if no trained operator)		
28.	Filtration (a) rapid sand after settlement with chem. coagulation	5	
	or (b) slow sand (on non-turbid or clarified water)	5	
	or (c) rapid sand without chem. coagulation	3	
	or (d) aeration followed by filtration (removal of chemical substances)	2	
	(Note – in this item deduct 1 if no trained operator)		
29.	Chlorination (a) auto residual control or proportional to flow or on constant flow following slow sand filtration or settlement with continuous chem. coagulation and rapid sand filtration	12	
	or (b) auto residual control or proportional to flow or on constant flow following continuous chem. coagulation and rapid sand filtration	10	
	or (c) auto residual control	8	
	or (d) proportional to flow or on constant rate of water flow such as steady pumped flow	6	
	or (e) manually set dose but variable water flow	1	
	(Note – in this item deduct 3 if no trained operator)		
30.	*Total B.1 Marks:*	.....	

B.2 Treatability of Raw Water (select appropriate mark) –

31.	Highly erodible catchment, water very turbid in flood, or well, or bore water requiring extensive treatment	6	
32.	*or* Erodible catchment (including milled or farmed), water visibly turbid in flood	5	
33.	*or* Bushed and stable catchment	4	
34.	*or* Water of constant quality (well or spring)	0	
35.	Source subject to algal blooms unless water microstrained (65 micron mesh or finer)	+ 4	
36.	River source with 3 days alternative supply or 3 days service storage available	– 4	
37.	*Total B.2 Marks:*	.....	
38.	**Total Marks B** (*B.1* minus *B.2*)	.....	

Determine Supply Grading – Marks A Minus B –

If A minus B equals:	*Supply grading is:*
Less than 3	A (completely satisfactory)
3 to 6	B (fair)
7 to 10	C (not generally acceptable but may have to be accepted in some small communities)
11 to 15	D (high degree of risk – not acceptable)
16 to 20	E (extremely high degree of risk)

(If several supplies connected to system, take the worst.)

SUPPLY GRADING:

PART II - MANAGEMENT AND DISTRIBUTION (select appropriate marks and add for total) -

C. Management and Distribution -

		MARKS:	SELECTED MARKS:
40.	Professional staff (a) full time specialist water engineer	0	
	or (b) management by general engineering staff	2	
	or (c) supervision by consulting engineer	3	
	or (d) no professional engineering staff	4	
41.	Operation (a) regular inspection and preventitive maintenance of source and equipment	0	
	or (b) occasional inspections of source and equipment	1	
	or (c) no regular attention	2	
42.	(a) Authority enforces Water Supplies Protection Regulations	0	
	(b) Authority does not enforce W.S. Protection Regulations	1	
43.	Age and condition of reticulation (a) fair to good	0	
	or (b) poor	1	
44.	Fire hydrants (a) screwdown only	0	
	or (b) ball hydrants in whole or part of system	2	
45.	Continuity of supply (a) pressure continuous except during pipeline repairs (i.e. adequate service storage or standby equipment)	0	
	or (b) pressure drops during high demand or because of lack of standby equipment	2	
46.	Service storage (a) covered	0	
	or (b) none or not covered	2	
47.	Chlorine residual tests (a) daily tests, continuous free residual	0	
	or (b) daily tests, continuous combined residual	1	
	or (c) not enough tests to show	2	
	or (d) usually no residual	2	
48.	Bacteriological tests (in distribution system) (a) complying with W.H.O. Int. Stds and nil plate count in 90% or more of samples	0	
	or (b) complying with W.H.O. Int. Stds and nil plate count in less than 90% of samples	1	
	or (c) not complying with W.H.O. Int. Stds or insufficient tests to determine	4	
49.	**Total Marks C:**	.....	

Determine Management and Distribution Grading -

If Total C equals:	*Management and Distribution grading is:*
Less than 3	a (completely satisfactory)
3 to 6	b (fair)
7 to 10	c (not generally acceptable but may have to be accepted in some small communities)
11 to 15	d (high degree of risk - not acceptable)
16 to 20	e (extremely high degree of risk)

50. **MANAGEMENT AND DISTRIBUTION GRADING:**

51. **COMBINED GRADING:** *Supply* \ *Management and Distribution*

Examples -

A:	*B:*	*A - B:*	*C:*	*Grading:*
12	24 - 4	0	3	Ab
16	11 - 5	10	2	Ca
3	0	3	13	Bd

DEPARTMENT OF HEALTH:

PUBLIC WATER SUPPLIES - SECOND GRADING 1965:

SUMMARY:

Dist. Ref.:

Head Office Ref.: H/125/390

HEALTH DISTRICT: .....

1 Name of Supply	2 Source		3 Population		4	PART I - SUPPLY GRADING																PART II - MANAGEMENT AND DISTRIBUTION										51	1961
	Location	Description	Perm	Peak	LA or G	13	18	22	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Combined Grade	Provisional Grading
						A1	A2	A3	A						B1							B2	B	Grade									C	Grade		